

1. A manufacturing equipment scheduling system for controlling run sequences of product lots to minimize low utilization rates of units of manufacturing processing equipment employed in fabricating said product lots, comprising;

a product lot sequence controller in communication with a product lot dispatch system to receive priority information of the product lots dispatched for fabrication, and in communication with an operations controller to establish an order in which said product lots are processed by units of said processing equipment, said product lot sequence controller establishing said order by performing the steps of:

receiving a dispatch order for at least one current product lot,

determining a priority of said current product lot,

if said current product lot has a high priority, determining if a

previous product lot remains in a selected unit of processing equipment,

if said previous product lot remains in the selected unit processing equipment, determining if said previous product lot is has a normal priority;

if said previous product lot has a normal priority, removing said product lot from said selected unit of processing equipment,

processing the product lot with the high priority; and

21                           upon completion of processing said current product lot with high  
22                           priority, continuing processing the previous product.

1     2.     The manufacturing equipment scheduling system of claim 1 wherein the product  
2           lot sequence controller further establishing said order by performing the steps of:

3                       if said current product lot has the normal priority, determining if the  
4                       previous product lot remains in the selected unit of processing  
5                       equipment;

6                       if said previous product lot remains in the selected unit of processing  
7                       equipment, continuing processing said previous product to completion;  
8                       and

9                       processing the current product lot with the normal priority.

1     3.     The manufacturing equipment scheduling system of claim 1 wherein the product  
2           lot sequence controller further establishing said order by performing the steps of:

3                       if said current product lot has the high priority, determining if the previous  
4                       product lot remains in the selected unit of processing equipment;

5                       if said previous product lot remains in the selected unit of processing  
6                       equipment, determining if said previous product lot has a high priority;

7                       if said previous product lot has the high priority, continuing processing said  
8                       previous product lot in said selected unit of processing equipment; and

9                   upon completion of said previous product lot, processing the current  
10                   product lot.

1     4.     The manufacturing equipment scheduling system of claim 1 wherein performing  
2           the step of removing said product lot from said selected unit of processing  
3           equipment includes the steps of:

4                   commanding said selected unit of processing to cease processing said  
5                   previous lot;

6                   recording status information of all pieces of product within said product lot,  
7                   and

8                   requesting said selected unit of processing equipment to return said  
9                   previous product lot to a staging location.

1     5.     The manufacturing equipment scheduling system of claim 1 wherein performing  
2           the step of continuing processing the previous product includes the steps of:

3                   examining status information of all pieces of product within said product  
4                   lot,

5                   requesting said selected unit of processing equipment to acquire said  
6                   previous product lot from the staging location; and

7                   commanding said selected unit of processing to continue processing said  
8                   previous lot.

- 1     6.     The manufacturing equipment scheduling system of claim 1 further comprising:
- 2                     a messaging facility connected to communicate messages between said
- 3                     product lot sequence controller, said units of said processing
- 4                     equipment, and product lot dispatch system.
- 1     7.     The manufacturing equipment scheduling system of claim 1 wherein said product
- 2                     lots are integrated circuit substrates and said units of said processing equipment
- 3                     are integrated circuit fabrication equipment.
- 1     8.     A method for scheduling manufacturing equipment to control run sequences of
- 2                     product lots to minimize low utilization rates of units of manufacturing processing
- 3                     equipment employed in fabricating said product lots, comprising;
- 4                     communicating with a product lot dispatch system to receive priority
- 5                     information of the product lots dispatched for fabrication;
- 6                     communicating with an operations controller to establish an order in which
- 7                     said product lots are processed by units of said processing equipment;
- 8                     and
- 9                     establishing said order by performing the steps of:
- 10                     receiving a dispatch order for at least one current product lot,
- 11                     determining a priority of said current product lot,

12 if said current product lot has a high priority, determining if a  
13 previous product lot remains in a selected unit of processing  
14 equipment,

15 if said previous product lot remains in the selected unit processing  
16 equipment, determining if said previous product lot is has a  
17 normal priority;

18 if said previous product lot has a normal priority, removing said  
19 product lot from said selected unit of processing equipment,  
20 processing the product lot with the high priority; and

21 upon completion of processing said current product lot with high  
22 priority, continuing processing the previous product.

1 9. The method of claim 8 wherein establishing said order further performs the steps  
2 of:

3 if said current product lot has the normal priority, determining if the  
4 previous product lot remains in the selected unit of processing  
5 equipment;

6 if said previous product lot remains in the selected unit of processing  
7 equipment, continuing processing said previous product to completion;  
8 and

9 processing the current product lot with the normal priority.

1 10. The method of claim 8 wherein establishing said order further performs the steps  
2 of:

3 if said current product lot has the high priority, determining if the previous  
4 product lot remains in the selected unit of processing equipment;

5 if said previous product lot remains in the selected unit of processing  
6 equipment, determining if said previous product lot has a high priority;

7 if said previous product lot has the high priority, continuing processing said  
8 previous product lot in said selected unit of processing equipment; and

9 upon completion of said previous product lot, processing the current  
10 product lot.

1 11. The method of claim 8 wherein performing the step of removing said product lot  
2 from said selected unit of processing equipment includes the steps of:

3 commanding said selected unit of processing to cease processing said  
4 previous lot;

5 recording status information of all pieces of product within said product lot,  
6 and

7 requesting said selected unit of processing equipment to return said  
8 previous product lot to a staging location.

1 12. The method of claim 8 wherein performing the step of continuing processing the  
2 previous product includes the steps of:

3 examining status information of all pieces of product within said product  
4 lot,

5 requesting said selected unit of processing equipment to acquire said  
6 previous product lot from the staging location; and

7 commanding said selected unit of processing to continue processing said  
8 previous lot.

1 13. The method of claim 8 wherein communicating with a product lot dispatch system  
2 is performed by the step of:

3 transferring messages to and from said product lot dispatch system.

1 14. The method of claim 8 wherein communicating with an operations controller is  
2 performed by the step of:

3 transferring messages to and from operations controller.

1 15. The method of claim 8 wherein said product lots are integrated circuit substrates  
2 and said units of said processing equipment are integrated circuit fabrication  
3 equipment.

1 16. An apparatus for scheduling manufacturing equipment to control run sequences  
2 of product lots to minimize low utilization rates of units of manufacturing  
3 processing equipment employed in fabricating said product lots, comprising;

4 means for communicating with a product lot dispatch system to receive  
5 priority information of the product lots dispatched for fabrication;

6 means for communicating with an operations controller to establish an  
7 order in which said product lots are processed by units of said  
8 processing equipment; and

9 means for establishing said order including:

10 means for receiving a dispatch order for at least one current  
11 product lot,

12 means for determining a priority of said current product lot,

13 means for determining if a previous product lot remains in a  
14 selected unit of processing equipment, if said current product lot  
15 has a high priority,

16 means for determining if said previous product lot is has a normal  
17 priority, if said previous product lot remains in the selected unit  
18 that schedules manufacturing equipment to control run  
19 sequences of product lots to minimize low utilization rates of



20 units of manufacturing processing equipment processing  
21 equipment;  
  
22 means for removing said product lot from said selected unit of  
23 processing equipment, if said previous product lot has a normal  
24 priority,  
  
25 processing the product lot with the high priority; and  
  
26 means for continuing processing the previous product, upon  
27 completion of processing said current product lot with high  
28 priority.

1 17. The apparatus of claim 16 wherein means for establishing said order further  
2 includes:

3 means for determining if the previous product lot remains in the selected  
4 unit of processing equipment, if said current product lot has the normal  
5 priority;  
  
6 means for continuing processing said previous product to completion, if  
7 said previous product lot remains in the selected unit of processing  
8 equipment; and  
  
9 means for processing the current product lot with the normal priority.

1 18. The apparatus of claim 16 wherein means for establishing said order further  
2 includes:

3 means for determining if the previous product lot remains in the selected  
4 unit of processing equipment, if said current product lot has the high  
5 priority;

6 means for determining if said previous product lot has a high priority;, if  
7 said previous product lot remains in the selected unit of processing  
8 equipment;

9 means for continuing processing said previous product lot in said selected  
10 unit of processing equipment, if said previous product lot has the high  
11 priority; and

12 means for processing the current product lot, upon completion of said  
13 previous product lot.

1 19. The apparatus of claim 16 wherein means for removing said product lot from said  
2 selected unit of processing equipment comprises:

3 means for commanding said selected unit of processing to cease  
4 processing said previous lot;

5 means for recording status information of all pieces of product within said  
6 product lot, and

7 means for requesting said selected unit of processing equipment to return  
8 said previous product lot to a staging location.

1 20. The apparatus of claim 16 wherein means for continuing processing the previous  
2 product comprises:

3 means for examining status information of all pieces of product within said  
4 product lot,

5 means for requesting said selected unit of processing equipment to  
6 acquire said previous product lot from the staging location; and

7 means for commanding said selected unit of processing to continue  
8 processing said previous lot.

1 21. The apparatus of claim 16 wherein means for communicating with a product lot  
2 dispatch system comprises:

3 means for transferring messages to and from said product lot dispatch  
4 system.

1 22. The apparatus of claim 16 wherein means for communicating with an operations  
2 controller includes:

3 means for transferring messages to and from operations controller.

1   23.   The apparatus of claim 16 wherein said product lots are integrated circuit  
2           substrates and said units of said processing equipment are integrated circuit  
3           fabrication equipment.

1   24.   A computer integrated manufacturing system that executes a program process  
2           for controlling run sequences of product lots to minimize low utilization rates of  
3           processing equipment manufacturing unit employed in fabricating said product  
4           lots, the program process comprising the steps of:

5                   communicating with a product lot dispatch system to receive priority  
6                   information of the product lots dispatched for fabrication;

7                   communicating with an operations controller to establish an order in which  
8                   said product lots are processed by units of said processing equipment;  
9                   and

10                  establishing said order by performing the steps of:

11                   receiving a dispatch order for at least one current product lot,

12                   determining a priority of said current product lot,

13                   if said current product lot has a high priority, determining if a previous  
14                   product lot remains in a selected unit of processing equipment,

15                   if said previous product lot remains in the selected unit processing  
16                   equipment, determining if said previous product lot is has a normal  
17                   priority;  
  
18                   if said previous product lot has a normal priority, removing said product  
19                   lot from said selected unit of processing equipment,  
  
20                   processing the product lot with the high priority; and  
  
21                   upon completion of processing said current product lot with high  
22                   priority, continuing processing the previous product.

1    25.   The computer integrated manufacturing system of claim 24 wherein the step of  
2           said program process for establishing said order further performs the steps of:

3                   if said current product lot has the normal priority, determining if the  
4                   previous product lot remains in the selected unit of processing  
5                   equipment;  
  
6                   if said previous product lot remains in the selected unit of processing  
7                   equipment, continuing processing said previous product to completion;  
8                   and  
  
9                   processing the current product lot with the normal priority.

1    26.   The computer integrated manufacturing system of claim 24 wherein the step of  
2           said program process for establishing said order further performs the steps of:

3           if said current product lot has the high priority, determining if the previous  
4           product lot remains in the selected unit of processing equipment;  
  
5           if said previous product lot remains in the selected unit of processing  
6           equipment, determining if said previous product lot has a high priority;  
  
7           if said previous product lot has the high priority, continuing processing said  
8           previous product lot in said selected unit of processing equipment; and  
  
9           upon completion of said previous product lot, processing the current  
10          product lot.

1   27.   The computer integrated manufacturing system of claim 24 wherein the step of  
2          said program process for performing the step of removing said product lot from  
3          said selected unit of processing equipment includes the steps of:  
  
4                  commanding said selected unit of processing to cease processing said  
5                  previous lot;  
  
6                  recording status information of all pieces of product within said product lot,  
7                  and  
  
8                  requesting said selected unit of processing equipment to return said  
9                  previous product lot to a staging location.

1    28.    The computer integrated manufacturing system of claim 24 wherein the step of  
2            said program process for performing the step of continuing processing the  
3            previous product includes the steps of:

4                    examining status information of all pieces of product within said product  
5                    lot,

6                    requesting said selected unit of processing equipment to acquire said  
7                    previous product lot from the staging location; and

8                    commanding said selected unit of processing to continue processing said  
9                    previous lot.

1    29.    The computer integrated manufacturing system of claim 24 wherein the step of  
2            said program process for communicating with a product lot dispatch system

3                    transferring messages to and from said product lot dispatch system.

1    30.    The computer integrated manufacturing system of claim 24 wherein the step of  
2            said program process for communicating with an operations controller is  
3            performed by the step of:

4                    transferring messages to and from operations controller.

1    31.    The computer integrated manufacturing system of claim 24 wherein said product  
2            lots are integrated circuit substrates and said units of said processing equipment  
3            are integrated circuit fabrication equipment.

1 32. A medium for retaining a computer program which, when implemented by a  
2 computing system that executes a program process for controlling run  
3 sequences of product lots to minimize low utilization rates of processing  
4 equipment manufacturing unit employed in fabricating said product lots, the  
5 program process comprising the steps of:

6 communicating with a product lot dispatch system to receive priority  
7 information of the product lots dispatched for fabrication;

8 communicating with an operations controller to establish an order in which  
9 said product lots are processed by units of said processing equipment;  
10 and

11 establishing said order by performing the steps of:

12 receiving a dispatch order for at least one current product lot,

13 determining a priority of said current product lot,

14 if said current product lot has a high priority, determining if a previous  
15 product lot remains in a selected unit of processing equipment,

16 if said previous product lot remains in the selected unit processing  
17 equipment, determining if said previous product lot is has a normal  
18 priority;



19 if said previous product lot has a normal priority, removing said product  
20 lot from said selected unit of processing equipment,  
21 processing the product lot with the high priority; and  
22 upon completion of processing said current product lot with high  
23 priority, continuing processing the previous product.

1 33. The medium of claim 32 wherein the step of said program process for  
2 establishing said order further performs the steps of:

3 if said current product lot has the normal priority, determining if the  
4 previous product lot remains in the selected unit of processing  
5 equipment;

6 if said previous product lot remains in the selected unit of processing  
7 equipment, continuing processing said previous product to completion;  
8 and

9 processing the current product lot with the normal priority.

1 34. The medium of claim 32 wherein the step of said program process for  
2 establishing said order further performs the steps of:

3 if said current product lot has the high priority, determining if the previous  
4 product lot remains in the selected unit of processing equipment;

5                   if said previous product lot remains in the selected unit of processing  
6                   equipment, determining if said previous product lot has a high priority;  
7                   if said previous product lot has the high priority, continuing processing said  
8                   previous product lot in said selected unit of processing equipment; and  
9                   upon completion of said previous product lot, processing the current  
10                  product lot.

1   35.   The medium of claim 32 wherein the step of said program process for performing  
2           the step of removing said product lot from said selected unit of processing  
3           equipment includes the steps of:

4                   commanding said selected unit of processing to cease processing said  
5                   previous lot;  
6                   recording status information of all pieces of product within said product lot,  
7                   and  
8                   requesting said selected unit of processing equipment to return said  
9                   previous product lot to a staging location.

1   36.   The medium of claim 32 wherein the step of said program process for performing  
2           the step of continuing processing the previous product includes the steps of:

3                   examining status information of all pieces of product within said product  
4                   lot,

5                    requesting said selected unit of processing equipment to acquire said  
6                    previous product lot from the staging location; and  
7                    commanding said selected unit of processing to continue processing said  
8                    previous lot.

1    37.    The medium of claim 32 wherein the step of said program process for  
2           communicating with a product lot dispatch system is performed by the step of:  
3           transferring messages to and from said product lot dispatch system.

1    38.    The medium of claim 32 wherein the step of said program process for  
2           communicating with an operations controller is performed by the step of:  
3           transferring messages to and from operations controller.

1    39.    The medium of claim 32 wherein said product lots are integrated circuit  
2           substrates and said units of said processing equipment are integrated circuit  
3           fabrication equipment.